

Appendix B. Aquatic Design Features for the Mud Creek Project

OBJECTIVE	DESIGN FEATURE
WATERSHED AND FISHERIES	
Ensure that within the Riparian Habitat Conservation Areas (RHCAs) the riparian-dependent resources receive primary emphasis.	<p>The INFISH RHCA buffers (USDA Forest Service, 1995) that are applicable to this project are:</p> <ul style="list-style-type: none"> • 300 feet on each side of fish-bearing streams • 150 feet on each side of perennial, non-fish bearing streams; • 100 feet on each side of intermittent streams; and • 50 feet on each side of wetlands < 1 acre in area. <p>A map of the RHCAs in the project area is available in the Project File.</p>
Ensure that the Montana Streamside Management Zone (SMZ) Law is met.	<p>RHCA boundaries will be designated and marked on the ground in consultation with the fisheries biologist or hydrologist.</p> <p>The following activities will be prohibited in the RHCAs:</p> <ul style="list-style-type: none"> • Timber harvest • Yarding of logs <p>There are three RHCAs that are exempted from these restrictions. These are designated as “area 1”, “area 2”, and “area 3”. Site-specific design features for each area are described below.</p> <p>Area 1. Area 1 is an approximate nine-acre area bounded by Nelson Creek on the west, the Nez Perce Fork on the south and east, and FR 468 on the north. The following design features will apply to area 1:</p> <ul style="list-style-type: none"> • No treatment will occur within 50 feet of Nelson Creek, the Nez Perce Fork, or any wetlands. • Manual thinning of submerchantable trees, piling of slash, and pile burning can occur anywhere outside of these no treatment zones. • Commercial harvest of live and dead trees will occur > 150 feet from Nelson Creek, and above the edge of the terrace surrounding the Nez Perce Fork. The edge of the terrace is mostly > 300 feet from the Nez Perce Fork. On the extreme east side of area 1, the edge of the terrace necks down to 200 feet from the Nez Perce Fork. • Harvest (tractor yarding) will occur in winter when adequate winter ground conditions are present. • Log landings will be located > 300 feet from Nelson Creek and the Nez Perce Fork. <p>Area 2. Area 2 is an approximate six-acre area bounded by the Little West Fork on the northeast, FR 5635 on the southwest, and FR 468 on the southeast. The following design features will apply to area 2:</p> <ul style="list-style-type: none"> • No treatment will occur within 150 feet of the south channel of the Little West Fork or within 50 feet of wetlands. • Manual thinning of submerchantable trees, piling of slash, and pile burning can occur anywhere outside of these no treatment zones. • Commercial harvest of live and dead trees will occur > 150 feet from the south channel of the Little West Fork. • Harvest (tractor yarding) will occur in winter when adequate winter ground conditions are present. • Log landings will be located either on or south/west of FR 5635 (i.e. the upland side of the road opposite the RHCA). <p>Area 3. Area 3 is an approximate 28 acre area bounded by Applebury Creek on the north, the West Fork Bitterroot River on the west, the toe of the mountain slope on the east, and the private land boundary on the south. Applebury Creek crosses the northern tip of area 3; Steep Creek is well outside the area to the south. The following design</p>

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	<p>features will apply to area 3:</p> <ul style="list-style-type: none"> • No treatment will occur below the edge of the terrace that parallels the West Fork Bitterroot River. The edge of the terrace is about 50 feet from the ordinary high water mark of the river. No treatment will occur within 50 feet of Applebury Creek. • Manual thinning of submerchantable trees, piling of slash, and pile burning can occur anywhere outside of these no treatment zones. • Downed trees can be winched out of the following areas for firewood harvest: river = edge of terrace to 150 feet; Applebury Creek = 50 to 100 feet. The vehicles doing the winching must stay > 150 feet from the river and > 100 feet from Applebury Creek. • Commercial harvest of live or dead trees will occur > 150 feet from the river and > 100 feet from Applebury Creek. • If tractor yarding is utilized, it must occur in winter when adequate winter ground conditions are present. If pick-up trucks with winch cables are used, there are no restrictions on season of harvest. • Log landings will be located > 300 feet from the river. • No equipment (tractor skidders or pick-up trucks) will enter within 150 feet of the river or within 100 feet of Applebury Creek. <p>With the exception of areas 1, 2, and 3, ground-based equipment will not enter the RHCAs without prior approval of the fisheries biologist or hydrologist. In situations where existing roads cross RHCAs, ground-based equipment can drive on the roads without approval of the fisheries biologist or hydrologist.</p> <p>Ground-based equipment will be prohibited from entering SMZs without the appropriate variance from Montana DNRC (SMZ Rule #4).</p> <p>Log landings will be located outside of RHCAs. Exceptions may be granted for previously used landings or natural openings that are located within RHCAs. These sites will not be used for landings until field reviewed and approved by the fisheries biologist or hydrologist.</p> <p>In RHCAs, trees can be felled when they pose a safety risk. Felled hazard trees will be left on-site unless their removal is deemed necessary for safety reasons by the Timber Sale Administrator (TSA). If a felled safety tree in an RHCA falls across a road, the portion of the felled tree blocking the road will be cut up and rolled/thrown into the nearby RHCA. All portions of the felled tree not blocking the road will be left on site.</p> <p>If trees felled outside of the RHCAs land or roll into the RHCAs, their boles may be removed, but the tops and limbs will be left behind in the RHCAs.</p> <p>Generally, there will be no fuel storage, mixing of fuels, or refueling equipment in RHCAs. If there are no alternatives, refueling in RHCAs may occur, but must be pre-approved by the fisheries biologist or hydrologist, and have an approved spill containment plan. Small pumps (for example, Mark III) and chainsaws can be refueled within the RHCA as long as proper spill containment actions are implemented.</p> <p>Best Management Practices (BMPs) will be applied and monitored during the administration of timber sale contracts. Applicable BMP's are in the project file.</p>
<p>Provide stable roads during log hauling.</p> <p>Conduct road maintenance to minimize erosion and sediment delivery.</p>	<p>Roads used for log hauling will be brought up to current BMP standards prior to hauling and will include addition or improvement of existing drivable dips, grading and shaping roads. Special attention will be paid to eliminate or otherwise reduce the effect of ditches that drain into streams.</p> <p>Log hauling will occur when roads are either adequately frozen or dry. Hauling will cease during periods that are wet enough to produce movement of fines on the road surface. The TSA is responsible for determining when conditions are too wet to haul and has the authority to suspend hauling during those times. The TSA or resource specialists will monitor road conditions during log hauling operations.</p> <p>Drainage from haul roads will be maintained during all hauling periods. This includes, but is not limited to, providing water access to ditches and inlets of ditch relief pipes,</p>

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	<p>and ensuring that outlets are kept free of blockage. Holes in snow berms will be established during the first plowing and kept open throughout the duration of winter hauling.</p> <p>Project-related traffic (all types of vehicles, not just log trucks) will be regulated during wet periods to minimize erosion and sediment delivery to streams.</p> <p>A maximum of 2000 log truck loads will be hauled on Blue Joint Creek FR 362. A maximum of 2000 log truck loads will be hauled on Nez Perce FR 468. A maximum of 500 truck loads will be hauled in the Rombo Creek drainage on FR 5715 between the Buck Creek Saddle and the junction of FR 13446 to FR 5715. A truck load is defined as one log truck driving into the landing empty, and then driving back out loaded with logs and headed to the mill.</p> <p>If any of the following near-stream haul roads are used for winter hauling (Blue Joint Creek FR 362; Nez Perce FR 468; Two Creek FR 732; Flat Creek FR 5637; and Tough Creek FR 5644):</p> <ul style="list-style-type: none"> • Sediment traps will be installed (1) below the outlets of ditch relief culverts within 100 feet of streams; (2) at stream crossings; and (3) in road ditches that drain into streams. • The sediment traps will be installed prior to winter hauling and maintained during all periods of winter hauling. <p>The sediment traps may consist of straw bales, straw waddles, fiber logs, slash filter windrows, and/or some combination of all of these.</p> <p>Prior to hauling any logs, the native surface portions of the following near-stream haul road segments will be graveled and BMP upgraded:</p> <ul style="list-style-type: none"> • Two Creek FR 732 • Tough Creek FR 5644 • Flat Creek FR 5637 <p>Portions of these roads have been previously graveled. If the current condition of the gravel surface and the BMP upgrades is deemed to be adequate by Forest engineers and hydrologists, then the previously graveled portions do not need to be re-graveled or have additional BMP upgrade work before hauling logs.</p> <p>All of the stream crossings (n = 7) in the Rombo Creek drainage portions of FR 5715 and FR 13446 will be graveled with bentonite aggregate. This will occur in addition to the normal suite of BMP upgrades.</p> <p>Road maintenance activities (including snow plowing and dust abatement) will follow the minimization measures for each road activity type specified in the April, 2015 Road-Related Activities Biological Opinion (USFWS, 2015b).</p> <p>Side-casting of road material (during road grading and snow plowing) in RHCAs is prohibited (SMZ Rule #8).</p> <p>On reconditioned or reconstructed roads, the grading that occurs at stream crossings will:</p> <ol style="list-style-type: none"> 1. Leave as much of the existing vegetation on the travelway as possible. 2. Avoid sidecasting road material within RHCAs (sidecasting is prohibited in RHCAs). 3. Install driveable dips on the uphill approach within 100-200 feet of the stream crossings to divert water and sediment from the travelway prior to the road entering the stream crossing area. The exact location of the dips will depend on individual site conditions such as road slope, presence of ditch in the road design, rock outcrops, and channel location. 4. Gravel stream crossings on open roads. <p>Addition of surface rock on Maintenance Level 1 and 2 roads at stream crossings would be dependent upon site conditions and consultation with engineering, fisheries or hydrology.</p> <p>On streams with sediment TMDL's (Ditch, Buck, and West Fork Bitterroot River), look</p>

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	for opportunities to reduce sediment from forest roads and ensure no additional sediment contributing points are created.																																
	On roads where existing water bars were bladed out during maintenance or reconditioning, install water bars. On forest roads, follow the Waterbar Spacing Guide on page II-27 of the Forest Plan:																																
	<table><tr><th>Gradient in percent</th><th colspan="3">Waterbar Spacing (Feet)</th></tr><tr><th></th><th>Loam Soils</th><th>Sandy Loam Soils</th><th>Sandy Soils</th></tr><tr><td>1 to 6</td><td>400</td><td>350</td><td>300</td></tr><tr><td>7 to 9</td><td>300</td><td>250</td><td>200</td></tr><tr><td>10 to 14</td><td>200</td><td>175</td><td>150</td></tr><tr><td>15 to 20</td><td>150</td><td>120</td><td>90</td></tr><tr><td>21 to 40</td><td>90</td><td>70</td><td>50</td></tr><tr><td>41 to 60</td><td>50</td><td>40</td><td>25</td></tr></table>	Gradient in percent	Waterbar Spacing (Feet)				Loam Soils	Sandy Loam Soils	Sandy Soils	1 to 6	400	350	300	7 to 9	300	250	200	10 to 14	200	175	150	15 to 20	150	120	90	21 to 40	90	70	50	41 to 60	50	40	25
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The erosive cutslope on FR 5715 near the Ditch Creek crossing in Section 13 will be stabilized and road drainage modified to divert road runoff away from Ditch Creek. If log hauling is planned for this section of road, this work will occur prior to hauling. Otherwise, it will occur as soon as practical.																																	
Maintain diverse and productive riparian plant communities.	Helicopter ignition will not occur in RHCAs.																																
	Hand ignition will not occur within 50 feet of streams and wetlands (SMZ Rule #3). Fire will be allowed to back into and burn across the RHCAs if it so desires.																																
	Generally, hand fireline will not be dug in the RHCAs. If needed, hand fireline can be dug in the RHCAs and must 1) avoid wetlands, 2) contain proper drainage structures, and 3) be recontoured and covered with slash upon completion of the burn. Machine fireline is prohibited in RHCAs. Allowing prescribed fire to back into RHCAs and wetlands negates the need for firelines near these areas.																																
	There will be no manual thinning, piling of slash, or pile burning within 50 feet of streams and wetlands (SMZ Rule #5).																																
	If drafting from streams occurs, intake hoses will be fitted with a screen mesh equal to or smaller than 3/32 inch.																																
	The fisheries biologist, hydrologist, and recreation specialist will work together to develop site specific plans for any dispersed campsites that need rehabilitation.																																
	Avoid spreading aquatic invasive species.	Prior to entering the project area, equipment that has the potential to come into contact with water must be inspected, clean and dry. Do not transfer water, sediment, or vegetation when moving between drafting sites. Operators will be encouraged to clean and dry their drafting equipment when moving between water sources and before the equipment comes in contact with water.																															
Ensure that water-related beneficial uses are protected and that State water quality standards are met when constructing and/or obliterating roads and trails.	Recontoured and decompacted roads and trails will be seeded, fertilized, and slashed. Weed-free straw mulch is required on sites located within 300 feet of streams.																																
	Where culverts with flowing water are removed, a straw bale check dam will be installed below the outlet prior to removing the culvert.																																
	In the West Fork-Rombo Creek (HUC 0301), West Fork-Painted Rocks Lake (HUC 0108), and West Fork-Lloyd Creek (HUC 0305) watersheds, avoid constructing specified roads in RHCAs. Where avoidance is not possible, minimize the length of specified roads in RHCAs to the shortest extent possible. In the Nez Perce (HUC 0204), Little West Fork (HUC 0203), and Blue Joint Creek (HUC 0106) watersheds, construction of specified roads is prohibited in RHCAs. Throughout the entire project area, there will be no new road crossings on fish-bearing streams.																																
	Temporary roads will not be built in RHCAs. Where road prisms already exist in																																

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	RHCAs (such as undetermined roads), and there are culverts at the stream crossings, those prisms may be used for temporary roads as long as dirt is not side-casted within the RHCA.
	Avoid constructing new motorized trails in RHCAs. Where avoidance is not possible, minimize the length of new motorized trails in RHCAs to the shortest extent possible. There will be no new crossings on fish-bearing streams.
	There will be no side-casting of soils in RHCAs. This prohibition applies to all types of road and trail construction and maintenance activities. All new road and trail segments constructed in RHCAs must employ full bench construction with no side-casting.
Reduce risk of changes in channel stability from increased flows.	Equivalent clearcut area (ECA) will not exceed 20% in any watershed. Where existing ECA is between 0 and 13%, watersheds are classified as Green, risk to water yield increases from new proposals that remove trees is low. Where existing ECA is between 13 and 18%, there is moderate risk of increases in water yield from new proposals and watersheds are classified as Yellow; or caution. Where ECA is greater than 18%, proposals are at high risk of raising ECA above the 20% threshold and increases in water yield are likely to be measurable. In moderate to high risk watersheds additional analysis should occur to evaluate risk of water yield increases against channel conditions and would follow the direction in Neesvig (2020).
Reduce erosion from burn piles.	Where large slash piles are burned and soil heating retards vegetation recovery, organic fertilizer and native seed will be applied following burning to reduce weeds and erosion.
Ensure that aquatic species are protected when spraying herbicides	Prior to any herbicide applications, aquatic specialists will complete and document toxicity calculations that show that the active ingredient applied will be of a LOWER CONCENTRATION than the 96-hour LC_{50} value divided by 25 ($LC_{50}/25$) found in the literature for either rainbow trout or cutthroat trout, whichever is lowest. The $LC_{50}/25$ is known as the “maximum acceptable toxicant concentration (MATC)”. Toxicity will be calculated at the subwatershed scale (e.g. Beavertail Creek, Ditch Creek, Tough Creek, etc), NOT the HUC 12 scale.
	Herbicides will not be applied in RHCAs.
	Only ground-based methods (backpack sprayers and/or vehicle-mounted sprayers) will be used to apply herbicides.
	Herbicides will be applied according to label directions.